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CALCULUS.

118. Proposed by C. C. BEBOUT, Professor of Mathematics, Elgin High School, Elgin, Ill.

A pole two inches in diameter is set vertically in a level plat of ground. At a point ten feet from the ground a string is attached. A man holds the other end of the string and walks about the pole keeping the string stretched taut, and his hand at a constant distance of four feet from the ground, till the string is all wound upon the pole. If string is ten feet long, how far has his hand moved in the operation ?

119. Proposed by B. F. FINKEL, A.M., M.Sc., Professor of Mathematics and Physics.Drury College. Springfield, Mo.

The curve $r^n=a^n\sin n\theta$ rolls along a straight line. Show that the intrinsic equation to the evolute of the locus of the pole is $s^n=a^m(1+1/n)^n\sin\psi$. [Edward's *Differential Calculus*, page 502.]

MECHANICS.

130. Proposed by W. J. GREENSTREET, M. A., Editor of The Mathematical Gazette, Stroud, Gloucestershire, England.

Two particles are projected from A and B on the same level at α, β to horizon, and in vertical planes with which AB makes angles θ, φ. They meet and coalesce into a single particle. Find the height of the latus rectum of the subsequent path above the level of A and B.

131. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, Ohio.

If the distributed weight on the foundations of a building is Wlb./(feet)^2, the foundations must be sunk $D=(W/w)\tan^4(\frac{1}{4}\pi-\frac{1}{2}\psi)$ feet deep in earth of density $w$lb./(feet)^3 and angle of repose ψ.

132. Proposed by THOS. U. TAYLOR, C.E., Department of Engineering, University of Texas, Austin, Tex.

1. A parabola, whose axis is vertical, is described on the vertical face of a reservoir wall. If the vertex O of the parabola is at the bottom of the wall, and the parabola intersects the surface in the points A, B, find the depth of the center of pressure of the water on the parabolic area ABO.

2. In the same problem find the center of pressure on the area included between the horizontal line through O, a vertical through B, and the curve OB.

133. Proposed by J. C. CORBIN, Superintendent of Schools, Pine Bluff, Ark.

A stick of square edged timber is 20 feet long, 10 inches square at large end, and 6 inches square at small end. How far from either end must a hand spike be placed, so that two men with the hand spike and one man at the end shall each have an equal weight to carry.